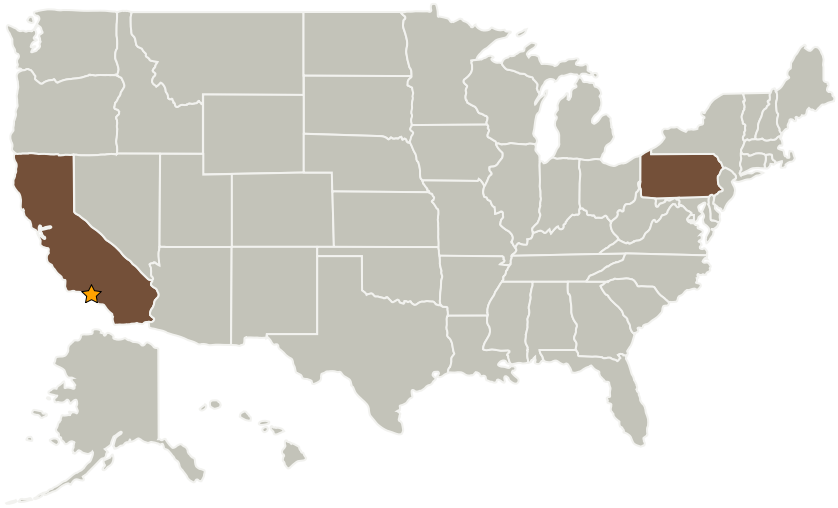
High Temperature Capacitors for Venus Exploration, Phase I

Completed Technology Project (2006 - 2006)

Project Introduction

High temperature power electronics have become a vital aspect of future designs for power converters in spacecraft, battle zone electric power, satellite power conditioning, and well drilling. The performance of these applications would benefit significantly from materials designed for high temperatures and harsh environmental conditions. NASA's Venus mission has some of the most stringent requirements with an operating temperature of 486C. Power systems must operate efficiently at these temperatures to eliminate the need for onboard cooling systems. The removal of these cooling systems will save space, reduce weight, and improve reliability. Currently, BaTiO3-based X7R capacitors are re-rated for use above 125C, and are rendered inoperable at temperatures approaching 300C. NPO-type dielectrics tend to operate at somewhat higher temperatures, but have low dielectric constants and become unreliable above 400C. TRS Technologies is pleased to respond to NASA's need for high temperature capacitors with this Phase I SBIR proposal. In this SBIR program, TRS Technologies and its subsidiary, Centre Capacitor, will develop a new family of high temperature capacitors based on high Curie temperature ferroelectrics that operate at temperatures far beyond conventional dielectric formulations. These new higher temperature (~490C) materials will be suited for the advanced power electronics required for Venus exploration.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
TRS Ceramics, Inc.	Supporting Organization	Industry	State College, Pennsylvania

Primary U.S. Work Locations	
California	Pennsylvania

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX14 Thermal Management Systems
  - TX14.1 Cryogenic Systems
    - TX14.1.3 Thermal Conditioning for Sensors, Instruments, and High Efficiency Electric Motors